IN THE SPECIFICATION

[14] The main engine 100 is controlled by a control unit 104, such as a generator control unit or aircraft computer, and provides power to electrical devices, or loads 106. The loads 106 can be any device that draws power from the engine 100. In the case of an aircraft, for example, the loads 106 may be aircraft devices such as galleys, passenger compartment devices, cockpit lights, etc. The APU 102 has its own associated APU controller 110 that communicates with the control unit ~~aircraft computer~~ 104 via a communication bus 112. APU control can be conducted by any known method, such as digital, analog, or hydromechanical systems, without departing from the scope of the invention.

[17] Figure 2 illustrates one method 200 in which the invention carries out no-break power transfer in greater detail. The APU controller 110 first obtains the main engine speed (e.g. a main engine generator frequency value) from the ~~generator~~ control unit 104 ~~or aircraft computer~~ (block 202). The main engine 100 speed acts as the starting point for the APU controller 110 in determining a target APU speed.

[21] The rate at which the APU speed adjustment takes place may be varied based on, for example, customer requests or due to limitations in system components. For example, the customer may request that the APU speed be changed over a selected time frame (e.g., 8 seconds), or fuel flow to the APU may be increased at a rate below a fuel rate limit to ensure stable fuel combustion and stable APU performance by preventing, for example, power surges caused by excessive back pressure. In one embodiment, the APU controller 110 ramps the APU speed up or down based on an APU rate limit (block 210). The APU rate limit can be determined and/or calculated by the APU controller 110 ~~100~~ based on, for example, the current fuel rate and other factors that affect APU performance.

[26] The APU controller 110 then sends the maximum APU load information to the control unit 104, which compares the maximum APU load value with the current aircraft electrical load requirement load on the main engine 100 (block 304). If the current aircraft electrical load requirement is below the maximum APU load, no-break power transfer can be conducted at the target APU speed

(block 208). If the current aircraft electrical load is above the maximum APU load, however, the control unit 104 selects which loads ~~electrical devices~~ 106 can be shut down temporarily during the no-break power transfer to reduce the load on the APU 102 during the transfer (block 310). For example, in an aircraft, the aircraft computer may shut down selected non-essential, low-priority loads 106 (e.g., galleys, passenger cabin lights, etc.) to reduce the total load. The selected low-priority loads 106 are shut down only for the duration of the no-break power transfer (e.g., less than a minute), making the effect of the load shutdown on aircraft operation negligible.

[27] Once the control unit 104 has shut down enough load devices 106 to reduce the main engine load below the calculated maximum APU load, no-break power transfer can be conducted at the APU target speed (block 208) as explained above by ramping the APU speed up or down so that the APU generator frequency matches the main engine generator frequency. Once the transfer is completed, the load ~~devices~~ 106 can be turned back on as the APU 102 increases speed and therefore generates increased power that allows it to handle greater loads.